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10/591,639

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Cheng Ni

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EXAMINER

TALPALATSKIY, ALEXANDER

ART UNIT

PAPER NUMBER

4147

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,639	<b>Applicant(s)</b> NI ET AL.	
	<b>Examiner</b> ALEXANDER TALPALATSKIY	<b>Art Unit</b> 4147	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 25-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/05/2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/05/2006, 06/13/2007</u> .                                  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the adjusting bars in the form of screws as claimed in claim 38, the synchronized shimming plug adjustment as claimed in claim 40, and the electric motors together with the computer measurement and processing system for magnetic bar adjustment as claimed in claims 41-43 must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 40 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification mentions synchronization, but does not describe how to achieve it and no drawings pertaining to synchronization are shown. Therefore the system/method describing in detail how to synchronize the movement of the shimming magnets needs to be shown so that one having ordinary skill in the art is able to reproduce the invention without undue experimentation.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 25-26 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US Patent 6700378) in view of Miyamoto et al. (US Patent 4672346).
6. In re claim 25, Sato, in figure 1, discloses a magnetic field adjusting device for mounting on a pole plate (13) mounted on a magnetic field generating source (11,12), the magnetic field adjusting device comprising a plurality of movable shimming plugs (14c), each mounted in a retaining groove (15c), whereby each shimming plug can only move in the direction of the retaining groove, characterized in that each shimming plug is driven by means of a screw (14x).
7. Sato fails to disclose the screws driving the shims to adjust their position and in turn adjust the strength of magnetic field of the apparatus.
8. Miyamoto et al. however, in figure 11, clearly discloses magnetic plugs (19) being driven by screws (20) that precisely adjust the position of the plugs in order to change the magnetic flux produced by the apparatus in the desired region.
9. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Sato's device with the screw adjusting mechanism as taught by Miyamoto et al. in order to better control magnetic field produced by the device.
10. In re claim 26, Sato in figure 5, discloses retaining swallow-tailed grooves (14y) in the plug and a corresponding trapezoidal shaped receiving portion (15y) to hold the plug in a fixed position.

11. Sato, however, fails to disclose the inversely arranged relationship where the plug has trapezoidal shape and the receiving groove having a swallow tailed hole.

12. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the inverse relationship of the groove in order to better suit the design of the device.

13. In re claim 28 Sato, in figure 1, discloses that the shimming plugs (14c) are dismountable for replacement with another shimming plug of different properties to change the overall magnetic field of the device (this is also discussed in the specification in the last paragraph of column 5).

14. In re claim 29 Sato, in figure 1, discloses the shimming plugs (14c) mounted at the periphery of the pole plate with the retaining grooves being oriented in the substantially radial direction of the pole plate.

15. In re claim 30 Sato, in figure 1, discloses a ring shaped part (15) mounted at the periphery of the pole plate with the retaining grooves (15c) being formed in the ring shaped part.

16. In re claim 31 Sato discloses the ring-shaped part but fails to disclose the number of grooves in the part. It would have been obvious to one having ordinary skill in the art at the time the invention was made to find the best number of grooves for the required application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

17. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Miyamoto et al. as applied to claim 25 above, and in further view of Baermann (US Patent 3241198).

18. In re claim 27, Sato modified by Miyamoto et al. discloses trapezoidal and rectangular groove/plug combination but fails to disclose T-shaped retaining grooves and T-shaped shimming plugs.

19. Baermann, however, in figure 2 discloses a T-shaped retaining groove with a T-shaped magnet engaged into the groove.

20. Therefore it would have been obvious to one skilled in the art at the time the invention was made to use the T-shaped arrangement of Baermann where the arrangement would perform better than the trapezoidal arrangement or where economic and manufacturing considerations make T-shaped arrangement more desirable.

21. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Miyamoto et al. as applied to claim 25 above, in further view of Douglas (US Patent Application 2003/0234623 A1).

22. In re claim 41, Sato modified by Miyamoto et al. discloses shimming plugs but fails to show electric motor being used to remotely adjust the plugs.

23. Douglas however, in figure 1, discloses an electric motor (12) that can be adjusted remotely from a user interface (30).

24. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the motor as taught by Douglas in order to

improve the versatility of the system and allow the system to be placed where manual access to adjust the plugs would be difficult.

25. Claims 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Miyamoto et al. in further view of Douglas as applied to claim 41 above, and in further view of Aubert (US Patent 4812765).

26. In re claims 42 and 43, the device of Sato/Miyamoto et al./Douglas discloses electric motor being used to move the shimming plugs through computer control, but fails to disclose a computer used to measure magnetic field and process the measurement.

27. Aubert however, in figure 1, discloses a computer programmed with magnetic field measurement/modeling software (27) being connected to a gauss meter (19) which measures the magnetic field of the device and allows the computer to produce control signals based on the measurements obtained from the meter.

28. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device of Sato/Miyamoto et al./Douglas with the computer from Aubert in order to significantly increase the shim adjustment procedure speed through a fully automated process controlled by the computer.

29. Claims 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of AAPA.

30. In re claim 45, Sato discloses a magnetic field generating device and field adjusting devices, but fails to show a pair of opposing magnetic field sources.



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31. AAPA however, in figure 1, discloses two opposing magnetic field generating sources (5,51), a pair of pole plates (3,31), mounted on the field generating sources.

32. Therefore it would have been obvious to one skilled in the art at the time the invention was made to have used the structural arrangement shown in AAPA to mount the device of Sato in order to achieve a stronger field with two devices.

33. In re claim 47, AAPA discloses an MRI apparatus in figure 1.

***Claim Rejections - 35 USC § 102***

34. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

35. Claims 32 and 34-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Aubert (US Patent 5168231).

36. In re claim 32 Aubert, in figure 12, discloses a magnetic field adjusting device comprising adjusting bars (8) mounted at the periphery of the magnetic field source (2) the bars being movable parallel to the magnetic field, the resulting field being adjusted by the positioning of the bars.

37. In re claim 34 Aubert, in figure 12, discloses adjusting bars (8) mounted movably in retaining means (102).

38. In re claim 35 Aubert, in figure 12, discloses the retaining means (102) being arranged at the periphery of the magnetic field generating source (2).

***Claim Rejections - 35 USC § 103***

39. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

40. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aubert.

41. In re claim 39 Aubert discloses adjusting bars but does not disclose replacing the bars with other bars with different magnetic properties. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have changed the bars with others as necessary, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

42. Claims 33, 36, 44 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aubert in view of AAPA.

43. In re claim 44 Aubert discloses a magnetic field generating device but fails to show a pair of opposing generating sources.

44. AAPA however, in figure 1, shows two magnetic field generating sources (5, 51) arranged opposite of each other to generate a magnetic field in between them.

45. Therefore it would have been obvious to one skilled in the art at the time the invention was made to have combined the magnetic field source from Aubert and opposing arrangement from AAPA in order to create a more uniform and stronger magnetic field for applications where a single source is inadequate.

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46. In re claim 46, AAPA in figure 1, discloses a yoke (1), an upper press plate (2) and a lower press plate (21) oppositely arranged; and magnetic field sources (5,51) and pole plates (3,31) oppositely mounted on the press plates (2,21).

47. In re claim 33, AAPA, in figure 1, discloses a pole plate (3, 31) mounted on a magnetic field generating source, with the adjusting bars on the source from Aubert being movable perpendicular to the pole plate when the source and the pole plate are interconnected.

48. In re claim 36, AAPA discloses a pole plate (3, 31) with the retaining means of the bars (102 in Aubert) being arranged at the periphery of the pole plate when the two structures are combined.

49. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aubert in view of Oslapas (US Patent 4944356).

50. In re claim 37 Aubert discloses adjusting magnet bars but fails to show the structure of the bars being adjusted with a rack and pinion mechanism.

51. Oslapas however, in figure 2 and in the specification in lines 12-17 of column 2, discloses a rack and pinion adjusting structure with a magnet being recessed into the movable rack.

52. Therefore it would have been obvious to one skilled in the art at the time the invention was made to have used a rack and pinion mechanism from Oslapas in order to adjust the position of magnetic bars. It should also be noted that rack and pinion is a common structure in the art and is widely used in precision adjustment mechanisms.

53. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aubert in view of Miyamoto et al. (US Patent 4672346).

54. In re claim 38 Aubert discloses adjusting magnetic bars, but fails to show the adjusting bars being in the form of screws.

55. Miyamoto et al. however, in figure 12, discloses magnetic screws (22) used to adjust magnetic field in the desired region.

56. Therefore it would have been obvious to one skilled in the art at the time the invention was made to have used the screws as taught by Miyamoto et al. to adjust the strength of the magnetic field of the device from Aubert since screws may allow a more precise field adjustment than bars.

### ***Conclusion***

57. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kasten et al. (US Patent 6529005) discloses a device for homogenizing magnetic field with shims. Vermilyea (US Patent 4698611) discloses a passive shimming assembly for a magnetic resonance magnet. Zijlstra (US Patent 4639673) discloses a magnetic resonance apparatus with a magnet and adjustable shims. Bittikofer (US Patent 5474520) discloses a microprocessor control circuit for controlling electric motors from a remote location. Pittaluga et al. (US Patent 6586936) discloses a trapezoidal groove for holding sheets made of ferromagnetic material. Breneman et al. (US Patent 4943774) discloses a magnetic field control apparatus using shimming plates connected to a pole plate. Ni et al. (US Patent Application 2007/0069731 A1) discloses an MRI apparatus with movable shimming plates and a

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yoke. Chaillout et al (US Patent 4937545) discloses a system of screws and bolts used to control position of magnets and influence magnetic field. Oue et al. (US Patent 5323136) discloses an electromagnetic apparatus with small magnetic substances used to adjust the strength of magnetic field. Ogawa (US Patent 5463363) discloses a magnetic field correction device with slotted passive shims. Aoki (US Patent 6448772) discloses a magnetic field adjusting apparatus and method. Dorri et al. (US Patent 5045794) discloses method of optimizing passive shim placement in magnetic resonance magnets. Sarwinski et al. (US Patent 5003276) discloses a method of shimming of permanent magnets. Mosteller (US Patent 6747537) discloses strip magnets with notches. Shimada et al. (US Patent 5343183) discloses a magnetic field correction device. Kwasniewicz et al. (US Patent 6311832) discloses a rack and pinion driving structure to drive magnets.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER TALPALATSKIY whose telephone number is (571)270-3908. The examiner can normally be reached on Monday - Friday, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Nguyen can be reached on (571) 272-4491. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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